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**STATEMENT OF WORK
FOR RD/RA CONSENT DECREE
EPA - Region X**

**APPENDIX A
STATEMENT OF WORK FOR THE EASTERN MICHAUD FLATS SUPERFUND SITE
OFF-PLANT AREA
POCATELLO, IDAHO**

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**STATEMENT OF WORK FOR FLUORIDE MONITORING
AT THE MICHAUD FLATS SITE
OFF-PLANT AREA**

I. INTRODUCTION

This Statement of Work (SOW) outlines the work to be performed by the Settling Defendant for the Off-Plant Area at the Eastern Michaud Flats Superfund Site in Bannock and Power Counties Idaho ("the Site"). The work outlined is intended to implement the fluoride monitoring portion of the remedy as described in the Record of Decision (ROD) for the Site (EPA, 1998), and to achieve the Performance Standards set forth in the Consent Decree and this SOW. The requirements of this SOW will be further detailed in work plans and other documents either attached hereto or to be submitted by the Settling Defendant for approval as set forth in this SOW.

The Settling Defendant is responsible for performing the work to implement the selected remedy. EPA shall conduct oversight of the Settling Defendant's activities throughout the performance of the work. The Settling Defendant shall assist EPA in conducting oversight activities.

EPA review or approval of a task or deliverable shall not be construed as a guarantee to the adequacy of such task or deliverable. If EPA modifies a deliverable pursuant to the Consent Decree, such deliverable as modified shall be deemed approved by EPA for the purposes of this SOW. A summary of the major deliverables that Settling Defendant shall submit for the work is presented in Section V.

II. OVERVIEW OF FLUORIDE MONITORING REQUIREMENTS

Section 10.1.5.1 of the ROD states that a monitoring program must be established "to determine the levels of fluoride present and to evaluate the potential risk to ecological receptors". The ROD specifies that the monitoring program will include the following:

- monitoring will occur within a three mile radius of the FMC/Astaris and Simplot facilities.
- monitoring may occur in specific areas outside the three mile radius that may contain sensitive species or be of particular ecological or cultural value.
- sampling shall include vegetation, soils, and appropriate biomonitors.
- submission of a monitoring plan to EPA for approval, including a quality assurance

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program plan and a sampling plan.

- annual evaluation of monitoring data to determine spatial and temporal trends in fluoride concentrations and potential ecological risks.

The ROD specifies that if fluoride levels indicate a risk may exist, then further evaluation will occur followed by source control or other action, if necessary.

III. COMPONENTS OF THE FLUORIDE MONITORING PROGRAM

The specific aspects of the monitoring program include sampling and analysis of fluoride in vegetation, soils, water, small mammal tissue, and biomonitoring of fluoride effects in small mammals and livestock. The monitoring program will also include an annual evaluation of spatial and temporal trends in fluoride exposure and potential risks.

A. Vegetation Sampling and Analysis

1. Sagebrush Habitat

a. Sample Matrix

Big sagebrush and thickspike wheatgrass shall be sampled and analyzed for fluoride within a three mile radius of the FMC/Astaris and Simplot facilities, and at specific locations in the Fort Hall Bottoms beyond the 3 mile radius. Sagebrush and thickspike wheatgrass represent important native grass and shrub species in proximity to the site (EPA, 1995). Fluoride contaminated sagebrush was determined to be a significant risk pathway to sage grouse, and thickspike wheatgrass was considered to be the predominant species of native grass in the area (EPA, 1995). Additionally, both species have historical fluoride monitoring data, facilitating the evaluation of temporal trends of contamination. Fluoride shall be analyzed in both washed and unwashed samples of the edible portions of vegetation to evaluate surface (e.g., deposition, dust) versus biologically incorporated fluoride.

b. Sampling Times and Locations

Sagebrush and thickspike wheatgrass shall be sampled once per season (spring, summer, fall, and winter). Fluoride emissions and deposition may vary seasonally as well as annually, and wildlife exposures may occur throughout the year.

A transect based approach shall be used to allow an evaluation of fluoride gradients in terrestrial vegetation because fluoride contamination has been detected

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in all directions radiating from the Site. Transects shall radiate from the Site in eight directions and extend north, northeast, northwest, west, southwest, south, southeast, and east of the FMC/Astaris and Simplot facilities for a distance of three miles. Sampling shall occur in areas located at 1, 2 and 3 miles from the facilities along the transects. Sampling in the Fort Hall Bottoms will also occur at four miles from the facilities along the north and northwest transects.

2. **Riparian Habitat**

a. **Sample Matrix**

Riparian plant species that have high ecological value (e.g., a forb and grass species) shall be selected for monitoring. Fluoride shall be analyzed in both washed and unwashed samples of the edible portions of vegetation to evaluate surface (e.g., deposition, dust) versus biologically incorporated fluoride.

b. **Sampling Times and Locations**

The selected species of vegetation in riparian habitat shall be sampled and analyzed for fluoride along Michaud Creek and the Portneuf River at locations that occur at a 1, 2, 3, and 4 miles radius from the facilities. Riparian vegetation shall be sampled once per season using a targeted rather than transect approach (i.e., at the intersection of the stream and mile radius).

B. **Surficial soil Sampling and Analysis**

1. **Sample Matrix**

Surficial soil samples shall be collected and analyzed for fluoride because surface samples (e.g., 0 to 1 foot) are considered to be the most ecologically relevant in current ecological risk assessment practice. Incidental ingestion of soil has been determined to be a significant risk pathway for wildlife at the Site (e.g., 78% of the estimated exposure of sage grouse in Michaud Flats; EPA, 1995).

2. **Sampling Times and Locations**

Soil shall be sampled once per season, and shall be co-located with vegetation sampling areas in both riparian and sagebrush steppe habitats.

C. **Surface Water Sampling and Analysis**

1. **Sample Matrix**

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Surface water samples shall be collected in Michaud Creek and the Portneuf River and analyzed for fluoride. Surface water provides a fluoride exposure pathway to both aquatic organisms and wildlife.

2. *Sampling Times and Locations*

Surface water samples shall be collected once per season and shall be co-located with riparian vegetation sampling areas in Michaud Creek and the Portneuf River.

D. **Small Mammal Sampling and Bioindicator Assessment**

1. *Tissue Fluoride*

a. *Sample Matrix*

Whole body samples of deer mice shall be collected for fluoride analysis because of their importance as wildlife prey, and EPA (1995) considered this species to be the most common small mammal in proximity to the Site. Fluoride will be analyzed in whole body samples consistent with the procedures used in EPA (1995).

b. *Sampling Times and Locations*

Small mammal samples shall be collected once per year (e.g., summer) because body residues are not expected to vary substantially by season. Small mammal samples shall be co-located in areas with riparian and sagebrush steppe vegetation sampling.

2. *Dental Fluorosis*

Small mammals that have been collected for tissue analysis shall also be evaluated for the presence of dental fluorosis by assessing the severity of fluoride induced lesions in incisors (e.g., Schroder et al., 1999). Dental fluorosis has been shown to be a sensitive biomonitoring tool and small mammal evaluation procedures have established (e.g., Schroder et al., 1999). Fluoride exposure can significantly increase the erosion rates of the incisors, and has been shown to exhibit a dose-response (i.e., increase effects with increasing exposure; Sheffield et al., 2001). Deer, elk, and bison in western states including Idaho have exhibited chronic fluoride toxicosis in response to elevated environmental exposures to fluoride at other sites (Shupe et al., 1984). Dietary exposure to wildlife may cause weakening of bones and skeletal deformities (Schroder et al., 1999). The Settling

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Defendant will present the specific fluorosis monitoring procedure for EPA approval.

E. Evaluation of Dental Fluorosis in Livestock

Cattle that graze in the Fort Hall Bottoms shall be assessed for dental fluorosis in incisors (e.g., Shupe et al., 1972) once per year by a veterinarian experienced in the diagnosis of fluorosis in livestock. The Settling Defendant will present the specific fluorosis monitoring procedure for EPA approval.

F. Reference Area Sampling and Analysis

Vegetation, soil, surface water, and small mammals shall be sampled in reference areas at the same frequency as in Site areas. Fluoride and fluorosis analyses will be performed in reference area samples using the same methods as for Site samples.

1. Sagebrush Steppe Habitat

A reference area shall be identified that is outside of the influence of Site emissions and that contains similar sagebrush steppe habitat as occur in proximity to the Site. Ferry Butte, Idaho, which was the reference area used in the Eastern Michaud Flats ecological risk assessment (EPA, 1995), shall be selected as the reference area unless an alternative can be adequately justified to EPA.

2. Riparian Habitat

The reference area for Michaud Creek and the Portneuf River shall be upstream areas located at a four mile radius from the facilities.

G. Trend Analysis and Risk Evaluation

1. Analysis of Spatial and Temporal Trends

Spatial trends in fluoride concentrations in surface water, soil, vegetation, and small mammals shall be evaluated from spatial gradients in both sagebrush steppe (transect samples) and aquatic/riparian habitats (upstream versus downstream). Temporal trends in fluoride concentrations shall be evaluated by comparing seasonal and annual measurements of fluoride in samples of surface water, soil, vegetation and small mammals. The analysis of spatial and temporal trends shall be reported annually.

2. Risk Evaluation

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Risks to terrestrial and aquatic organisms shall be evaluated annually, based on exposure concentrations determined from fluoride measurements in samples of surface water, soil, vegetation, and small mammals. The risk evaluation will have the following components and requirements:

a. Ecological Receptors and Exposure Pathways

Ecological receptors will include both aquatic and terrestrial organisms. The terrestrial receptors will include plants, soil invertebrates, herbivores, omnivores, and predators. The Settling Defendant shall propose and justify the ecological receptors and exposure pathways to be evaluated, and shall consider the receptors and pathways addressed in the ecological risk assessment (EPA, 1995).

b. Exposure Point Concentrations

Exposure point concentrations (EPCs) will be annual average concentrations derived from the foraging or home range of each ecological receptor. Wildlife exposures shall be determined using standard exposure models that estimate a cumulative dose from drinking water, incidental soil ingestion, and forage/prey consumption (e.g., Sample et al., 1996). The Settling Defendant shall propose wildlife exposure parameters (e.g., ingestion rates, area use factors) for EPA approval.

c. Toxicity Reference Values

The Settling Defendant shall derive and propose soil, surface water, and wildlife toxicity reference values (TRVs) for EPA approval. Fluoride toxicity to aquatic life shall be evaluated by comparing measured surface water concentrations to the secondary chronic value of 1.18 mg/L fluoride (Suter, 1996), unless an alternative value can be justified. TRVs for wildlife will be derived from studies reporting the toxicity of ingested fluoride.

d. Risk Calculation

Risks shall be calculated using a hazard quotient (HQ) approach, where an HQ is calculated from the ratio of the EPC and TRV (i.e., $HQ = [EPC]/TRV$).

e. Reporting

The risk evaluation results will be reported as part of the annual report, rather than as a formal ecological risk assessment. The risk evaluation will summarize EPCs and TRVs used for each receptor, the calculated HQs, and conclusions.

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H. Modifications to the Monitoring Program

As allowed for in the ROD, additional investigations may be merited if monitoring indicates the potential for ecologically significant exposures, impacts, or risks. EPA will evaluate the significance of any risk calculations that resulted in an HQ greater than one.

IV. DESCRIPTION OF PLANS AND REPORTS

A. General Project Management

1. Progress Reports

The Settling Defendant will provide EPA with signed quarterly progress reports that summarize quarterly monitoring activities performed in support of the fluoride monitoring program. The reports shall include, but are not limited to, the following information:

- Introduction, including the scope and general purpose of the work currently being conducted
- Activities/tasks undertaken during the reporting period, and expected to be undertaken during the next period
- Deliverables and milestones completed during the reporting period, and expected to be completed during the next reporting period
- Identification of issues and actions that have been taken or are being taken to resolve the issues
- Status of the overall project schedule and any proposed schedule changes

2. Technical Memoranda

Technical Memoranda are the mechanism for requesting modifications of plans, designs, and schedules. In the event that EPA or the Settling Defendant determines that modification to an approved plan or schedule is necessary, the Settling Defendant shall submit a memorandum describing the modifications to the EPA Project Coordinator. The memorandum shall include, but is not limited to, the following information.

- General description of, and purpose of, the modification
- Justification, including any calculations, for the modification

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- Actions to be taken to implement the modification
- Recommendations

B. Project Planning

The Settling Defendant shall gather and evaluate all existing data and information relevant to assessing ecological exposures and risks in proximity to the Site. Once this information has been collected and evaluated, the scope of the monitoring program shall be planned. The Settling Defendant shall meet with EPA at the completion of the evaluation prior to proceeding with the monitoring program.

C. Fluoride Monitoring Program Plan

The fluoride monitoring program plan shall include a Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan. All documents shall be approved by EPA prior to initiation of the monitoring program.

1. Sampling and Analysis Plan

The Sampling and Analysis Plan provides guidance for all field work by defining in detail the sampling and data gathering methods to be used. The Sampling and Analysis Plan shall be written so that a field sampling team unfamiliar with the Site and off-plant areas would be able to gather the samples and field information required. Specifically, the Sampling and Analysis Plan shall present a detailed description of the following:

a. Tasks and Work Products

The tasks to be performed and a description of the work products to be submitted to EPA.

b. Schedule

A schedule for completion of each required activity and submission of each deliverable required by this Consent Decree, including those in this SOW.

c. Chemical and Biological Sampling and Analyses

Maps of sample locations and tables presenting sample type (e.g., soil), mass or volume and number of samples to be collected, and sampling frequency. Sampling procedures and chemical and biological analytical methods are required for the

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following:

- i. Quarterly sampling and analysis of fluoride concentrations in surface water, soil, and vegetation (e.g., sagebrush, thickspike wheatgrass) at Site and reference area riparian and sagebrush steppe habitats.
- ii. Annual sampling and analysis of fluoride concentrations in small mammals at Site and reference area sagebrush steppe and riparian habitats.
- iii. Annual evaluation of dental fluorosis in small mammals (e.g., deer mouse) at Site and reference area sagebrush steppe and riparian habitats, and in livestock at selected locations.

d. *Trend and Risk Evaluation*

A comprehensive annual evaluation of seasonal and yearly variation in fluoride concentrations and potential ecological risks in both sagebrush steppe and riparian habitats.

2. *Quality Assurance Project Plan*

The Quality Assurance Project Plan shall be developed that presents the sampling and analysis procedures and the protocol for ensuring that quality data are collected during the monitoring program.

3. *Health and Safety Plan*

A Health and Safety Plan shall be prepared. EPA will not approve the Settling Defendant's Health and Safety Plan, but rather EPA will review it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and environment.

V. **SUMMARY OF MAJOR DELIVERABLES**

The major deliverables for the fluoride monitoring program will be Annual Program Reports that summarize the fluoride monitoring program data and evaluation results for each year of monitoring. The reports shall include, but are not limited to, the following information:

- Introduction, including the scope and general purpose of the monitoring program

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- Summary of fluoride levels in soil, vegetation, surface water, and small mammals for that monitoring year
- Summary of fluorosis evaluations in small mammals and livestock for that monitoring year
- Screening of ecological risks using that monitoring year's data.
- Analysis of spatial and temporal trends in fluoride levels and dental fluorosis using all available data.
- Summary and conclusions

VI. PROJECT SCHEDULE

The project schedule for the fluoride monitoring program is provided below:

| Milestone | Due Date |
|--|--|
| Draft Fluoride Monitoring Program Plan | within 30 days of Consent Decree entry |
| Final Monitoring Program Plan | within 30 days of EPA draft Program Plan review |
| Initiation of first quarterly monitoring | within 30 days of Program Plan finalization |
| Quarterly Progress Report | within 30 days of each monitoring event |
| Annual Program Report | within 90 days of each fourth quarterly monitoring event |

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